

Claims

- [c1] 1. A mercury vapor discharge fluorescent lamp comprising a light-transmissive glass envelope having an inner surface, a phosphor layer disposed adjacent said inner surface of said glass envelope, a discharge-sustaining fill gas of mercury vapor and inert gas sealed inside said envelope, and a mercury barrier, said mercury barrier being effective to inhibit mercury atoms from absorbing into said glass envelope and amalgamating with sodium atoms therein, wherein said mercury barrier is substantially non-mercury absorptive.
- [c2] 2. A lamp according to claim 1, said glass envelope being made from soda-lime glass.
- [c3] 3. A lamp according to claim 1, said mercury barrier comprising a material selected from the group consisting of potassium atoms, potassium ions, calcium atoms, calcium ions, SnO_2 , and mixtures thereof.
- [c4] 4. A lamp according to claim 1, said mercury barrier being a mercury-insulating section of said glass envelope, said mercury-insulating section extending radially outward from said inner surface of said glass envelope.
- [c5] 5. A lamp according to claim 4, wherein said mercury-insulating section has a radial depth of at least 10 μm measured from said inner surface of said glass envelope.
- [c6] 6. A lamp according to claim 4, wherein said mercury-insulating section has a radial depth of 25–100 mm measured from said inner surface of said glass envelope.
- [c7] 7. A lamp according to claim 4, wherein said mercury-insulating section is a compressional section of densely packed species, and wherein said densely packed species does not substantially complex, react, or amalgamate with said mercury vapor inside said envelope.
- [c8] 8. A lamp according to claim 4, wherein said mercury-insulating section is substantially transmissive of visible light.

- [c9] 9. A lamp according to claim 7, wherein said densely packed species is selected from the group consisting of potassium atoms and potassium ions.
- [c10] 10. A lamp according to claim 7, wherein said densely packed species is selected from the group consisting of calcium atoms and calcium ions.
- [c11] 11. A lamp according to claim 4, wherein said mercury-insulating section of said glass envelope is substantially electrically non-conductive.
- [c12] 12. A lamp according to claim 1, said lamp exhibiting fewer than 30 degrees of discoloration at 2000 hours of cyclical operation.
- [c13] 13. A lamp according to claim 1, said lamp exhibiting fewer than 30 degrees of discoloration at 3000 hours of cyclical operation.
- [c14] 14. A lamp according to claim 1, said lamp having a lumen efficiency of at least 54 lumens/watt at 2000 hours cyclical operation.
- [c15] 15. A lamp according to claim 1, said lamp having a lumen efficiency of at least 54 lumens/watt at 3000 hours of cyclical operation.
- [c16] 16. A lamp according to claim 1, said lamp having a lumen maintenance of at least 0.88 at 2000 hours of cyclical operation.
- [c17] 17. A lamp according to claim 1, said lamp having a lumen maintenance of at least 0.88 at 3000 hours of cyclical operation.
- [c18] 18. A lamp according to claim 1, said mercury barrier being a mercury barrier layer disposed adjacent said phosphor layer.
- [c19] 19. A lamp according to claim 18, said mercury barrier layer being a potassium-containing layer having at least 0.5, weight percent potassium.
- [c20] 20. A lamp according to claim 19, said mercury barrier layer being 10-100 nm thick.
- [c21] 21. A lamp according to claim 1, said mercury barrier being a tin oxide barrier layer disposed adjacent said inner surface of said glass envelope.

- [c22] 22. A lamp according to claim 21, said tin oxide barrier layer being a compressional layer of densely packed non-activated and substantially electrically non-conductive tin oxide.
- [c23] 23. A lamp according to claim 21, said tin oxide barrier layer being 5-200 nanometers thick.
- [c24] 24. A lamp according to claim 1, said phosphor layer comprising a metal ion species therein as said mercury barrier.
- [c25] 25. A lamp according to claim 24, wherein said metal ion species is selected from the group consisting of potassium species, calcium species, and mixtures thereof.
- [c26] 26. A lamp according to claim 24, wherein said metal ion species is a potassium salt selected from the group consisting of potassium chloride, potassium nitrate, potassium borate, and mixtures thereof.
- [c27] 27. A lamp according to claim 1, said lamp being a high wattage fluorescent lamp and having a lumen maintenance of at least 0.6 at 2000 hours of cyclical operation.
- [c28] 28. A lamp according to claim 1, said lamp being a high wattage fluorescent lamp and having a lumen maintenance of at least 0.6 at 3000 hours of cyclical operation.